TOUCH SCREEN DEVICE AND SHIELDING BRACKET THEREFOR

BACKGROUND OF THE INVENTION

The present invention relates to a touch screen device and more particularly to a shielding bracket used in the touch screen device to shield the touch screen from external noise due to stray capacitance.

Capacitive touch screens have become one of the major touch screen technologies in marketplaces such as the hospitality and quick-service point of sale marketplaces, mainly due to their extremely high durability and their resistance to interference from foreign objects on the screen, such as dirt and grease.

Capacitive touch screens calculate touch points by measuring the amount of current that the body of a user of the screen draws from the screen. This current drain is caused by capacitive coupling of the user's finger (and body) from a conductive film layered on the glass of the screen. A capacitor is defined as being two conductive surfaces separated by a thin insulating surface. In the case of a capacitive touch screen, as shown in FIG. **1**, the two conductive surfaces are the user's finger **10** and a conductive coating **12** on the glass **14** of the touch screen. The insulating substance is a thin protective covering **16** layered on top of the conductive coating **12**. This combination forms a capacitor, represented symbolically in FIG. **1** by the capacitor **18**.

The touch point is calculated by measuring the current drain at the four corners of the touch screen. The closer a user's touch is to a corner, the more current drain will be measured from that corner. A microprocessor circuit compares the current drain from the four corners and calculates an X,Y coordinate for the touch point.

It is the fact that the hand does not actually touch the conductive coating that makes capacitive touch screens so durable, for reasons which include the following. The insulating coating can be made very strong so that it protects the conductive coating from scratching and wearing over time. Any foreign objects on the insulating coating (dirt, grease, etc.) will not degrade the performance of the touch screen. The touch screen assembly has no moving parts; therefore it can be sealed to the bezel of the touch screen device to prevent leakage of liquids into the device.

Unfortunately, it is also the characteristic that the hand does not touch the conductive coating that makes capacitive touch screens susceptible to interference. For example, as shown in FIG. **2**, a left hand **20** of a user placed on the bezel **22** of a touch screen device **24** will induce enough stray capacitance to cause error, as shown by point **26**, in the X, Y coordinates which are calculated by the system to represent a point **28** touched on the touch screen **30** by a finger **32** of the right hand **34** of the user.

The reason that the touch screen **30** so easily picks up the capacitance (C') of the hand **20** is that the active area of the touch screen **30** is only approximately 75% of the entire area of the glass. The 25% unused area of glass (hidden from view under the bezel **22**) is required to distribute charge evenly throughout the conductive coating. Although this portion of the touch screen is unused, it is still sensitive to capacitance. Therefore it easily picks up the large capacitance of the hand **20** since only the thin bezel **22** separates the hand **20** from the glass of the touch screen **30**.

Current methods to shield this sensitive unused portion of the touch screen **30** from stray capacitance induced by the hand **20** of a user of the touch screen device **24**, which includes the touch screen **30** and an associated display **34**, include covering the unused portion of the screen with a piece of conductive tape **33** beneath the bezel **22**, as shown in FIG. **3**, and then driving the tape with the same signal that is used to drive the four corners of the touch screen glass. Although the conductive tape certainly is an improvement over the unshielded glass, it still allows some stray capacitance to get through. Another problem is that the four wires that connect to the corners of the touch screen glass are also sensitive to stray capacitance, and the tape does not shield these wires at all.

SUMMARY OF THE INVENTION

The present invention provides an integrated display (such as an LCD) and a touch screen mounting bracket that completely shields the touch screen from external noise due to stray capacitance. This shielding bracket is superior to the conductive tape shielding method because it covers the touch screen in a "seamless" manner, thereby shielding the glass much more effectively, and it uses highly conductive rigid metal which increases the effectiveness of the shield. The unused glass of the touch screen under the bezel is shielded with conductive metal, the four signal wires are shielded, and the sides of the glass of the touch screen are shielded.

It is accordingly an object of the present invention to provide a novel and effective shielded capacitive touch screen device.

Another object is to provide a capacitive touch screen shield which includes two complementary conductive metal elements which are joined together with the touch screen therebetween.

Another object is to provide an integrated LCD and touch screen glass mounting bracket that completely shields the touch screen from external noise due to stray capacitance.

Another object is to provide a shield bracket which is effective to shield unused glass of the touch screen, signal wires which are coupled thereto and the sides of the touch screen glass.

Additional benefits and advantages of the present invention will become apparent to those skilled in the art to which this invention relates from the subsequent description of the preferred embodiment and the appended claims, taken in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a diagrammatic view illustrating the operation of a capacitive touch screen.

FIG. **2** is a diagrammatic view showing the manner in which errors are introduced in conventional capacitive touch screens when the hand of a user is inadvertently placed on the bezel of a touch screen device.

FIG. **3** is a partial sectional view of a prior art capacitive touch screen device, showing a tape shield employed therein.

FIG. **4** is a perspective view of a touch screen device.

FIG. **5** is a partial sectional view, taken on line **5—5** of FIG. **4**, of the capacitive touch screen device of the present invention.

FIG. **6** is a plan view of the touch screen top shield of the touch screen device of the present invention.

FIG. **7** is a plan view of the touch glass holder shield of the touch screen device of the present invention.